DEVICE FOR INTERWORKING ASYNCHRONOUS TRANSFER MODE CELLS

TECHNICAL FIELD OF THE INVENTION

The present invention relates in general to telecommunications signal processing and more particularly to a device for interworking asynchronous transfer mode cells.

BACKGROUND OF THE INVENTION

Conventional asynchronous transfer mode interworking techniques utilize an interface device that identifies traffic for asynchronous transfer mode processing and transfers the traffic to a separate device for processing. Non-asynchronous transfer mode traffic follows a separate and different processing path. Thus, a schism exists in the industry with respect to products that perform asynchronous transfer mode interworking and products that perform conventional wide area network processing. Therefore, it is desirable to eliminate this schism when providing an asynchronous transfer mode interworking capability.

SUMMARY OF THE INVENTION

From the foregoing, it may be appreciated by those skilled in the art that a need has arisen for a technique to integrate asynchronous transfer mode interworking in a wide area network transport environment. In accordance with the present invention, a device for interworking asynchronous transfer mode cells is provided that substantially eliminates or greatly reduces disadvantages and problems associated with conventional asynchronous transfer mode processing techniques.

According to an embodiment of the present invention, there is provided a device for interworking asynchronous transfer mode cells that includes a transmission convergence sublayer that receives traffic carrying asynchronous transfer mode cells. Transmission convergence sublayer identifies each traffic carrying asynchronous transfer mode cell received. An encapsulation unit receives traffic carrying asynchronous transfer mode cells identified by the transmission convergence sublayer. The encapsulation unit encapsulates each identified traffic carrying asynchronous transfer mode cell into an encapsulation frame having a protocol format readable by a serial communications controller.

The present invention provides various technical advantages over conventional asynchronous transfer mode processing techniques. For example, one technical advantage is to encapsulate asynchronous transfer mode cells in a protocol format readable by a serial communications controller. Another technical advantage is to use conventional serial communications controllers designed for frame relay or other packet protocols in

processing asynchronous transfer mode cell information. Yet another technical advantage is to provide a device that can be programmed to provide any information transfer service at any port. Other technical advantages may be readily ascertainable by those skilled in the art from the following figures, description, and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the present invention and the advantages thereof, reference is now made to the following description taken in conjunction with the accompanying drawings, wherein like reference numerals represent like parts, in which:

FIGURE 1 illustrates a simplified block diagram of an asynchronous transfer mode interworking device in a telecommunications environment.

DETAILED DESCRIPTION OF THE INVENTION

FIGURE 1 is a block diagram of a telecommunication environment 10. Telecommunication environment 10 includes an interface card 12 and a system communication controller 14. Interface card 12 receives traffic carried on a T1/E1 trunk line 15, processes the traffic stream, and provides the traffic stream to system communication controller 14 for analysis and further processing. Interface card 12 includes a framer unit 16, a transmission convergence sublayer 18, an encapsulation unit 20, and a controller unit 22. System communication controller 14 includes one or more serial communications controllers 30, a direct memory access unit 32, a main memory 34, and a processor 36.

Interface card 12 provides an any port, any service capability through a traditional wide area network link. Interface card 12 may provide through the same hardware an asynchronous transfer mode interworking capability as well as the ability to process traffic in other protocols including frame relay, point to point (PPP), and high level data link control (HDLC) protocols. Information may be downloaded to any element of interface card 12 to allow for changing of communication capabilities of interface card 12 according to a desired operating protocol.

For asynchronous transfer mode interworking operation, framer unit 16 receives traffic carrying asynchronous transfer mode cells from T1/E1 trunk line 15. Framer unit 16 provides the asynchronous transfer mode cells to transmission convergence sublayer 18 for processing preferably over a time division multiplexed bus. Transmission convergence sublayer 18 identifies and

demarcates each asynchronous transfer mode cell. Transmission convergence sublayer 18 recognizes a beginning and end of an asynchronous transfer mode cell and checks its payload for traffic or null information. If an asynchronous transfer mode cell has null information in its payload, then transmission convergence sublayer discards the null cell. If the payload of an asynchronous transfer mode cell carries traffic, then transmission convergence sublayer 18 performs header error correction and checksum processing on the asynchronous transfer mode cell. Asynchronous transfer mode cells that fail header error correction and/or checksum processing are discarded by transmission convergence sublayer 18. All valid traffic carrying asynchronous transfer mode cells are provided to encapsulation unit 20. Transmission convergence sublayer 18 preferably removes the header error correction byte of valid asynchronous transfer mode cells prior to transfer to encapsulation unit 20.

Encapsulation unit 20 facilitates communications between transmission convergence sublayer 18 and serial communications controller 30. Typically, serial communications controller 30 does not understand the asynchronous transfer mode format nor does it know what an asynchronous transfer mode cell is, but serial communications controller 30 does understand certain protocols. Encapsulation unit 20 will place the valid asynchronous transfer mode cells into a protocol format understandable by serial communications controller 30 so that the asynchronous transfer mode format is transparent to serial communications controller 30. Preferably, encapsulation unit 20 generates encapsulated frames

carrying the asynchronous transfer mode cells using the HDLC protocol though other protocols readable by serial communications controller 30 may also be implemented as desired. Encapsulated frames are provided to controller unit 22.

For operation flexibility, interface card 14 may operate in a conventional mode where traffic is received and processed at framer unit 16 in a protocol, such as frame relay, recognizable by serial communications controller 30. Controller unit 22 determines whether asynchronous transfer mode interworking or conventional protocol processing is being performed by interface card 14. If conventional protocol processing is being performed, controller unit 22 provides the traffic directly from framer unit 16 to serial communications controller 30. For asynchronous transfer mode interworking operation, controller unit 22 provides encapsulated frames to serial communications controller 30 from encapsulation unit 20. Traffic may be provided from controller unit 22 over a time division multiplexed bus to one or more ports 28 for receipt by a plurality of serial communications controllers 30. Alternatively, controller unit 22 may provide traffic to serial communications controllers 30 over a National Mobile Station Identification (NMSI) link where each serial communications controller 30 can receive traffic from its dedicated port 28.

Upon receiving the encapsulated frame, serial communications controller 30 extracts the traffic payload and sends the traffic payload to main memory 34 as controlled by direct memory access unit 32. Processor 36 takes the traffic payload and performs a segmentation and

reassemble process to recover the traffic. The segmentation and reassemble process is performed in software by processor 36. Though an asynchronous transfer mode cell is transparent to serial communications controller 30, processor 36 can recognize the asynchronous transfer mode cell in order to perform the appropriate segmentation and reassemble process.

In the upstream direction for asynchronous transfer mode interworking, encapsulation unit 20 receives encapsulated frames from serial communications controller 30. Encapsulation unit 20 performs un-encapsulation of the asynchronous transfer mode cells from the encapsulated frames. Encapsulation unit 20 performs bit stuffing as necessary. The un-encapsulated asynchronous transfer mode cells are provided to transmission convergence sublayer 18 for processing. Transmission convergence sublayer 18 re-inserts a header error correction byte into each asynchronous transfer mode cell received from encapsulation unit 20. Transmission convergence sublayer 18 also inserts null cells as necessary for proper traffic transport.

Thus, it is apparent that there has been provided, in accordance with the present invention, a device for interworking asynchronous transfer mode cells that satisfies the advantages set forth above. Although the present invention has been described in detail, it should be understood that various changes, substitutions, and alterations may be readily ascertainable by those skilled in the art and may be made herein without departing from the spirit and scope of the present invention as defined by the following claims.